Helical Coil Heaters are available in two basic configurations: HCS-series for single hot oil circuits, and HC-series for multiple hot oil circuits. Four standard models are available in each series, with outputs from 1.2 million to 4 million Btu/hour. All heaters can be customized to meet your specific needs.

**Single Circuit Systems:** Small plants with only one or two liquid asphalt tanks usually need only one hot oil circuit with one pump. HCS-series heaters are well-suited for such plants. One circulating pump, mounted on the heater skid, circulates the heat transfer oil through the heater and through heated plant components.

**Multiple Circuit Systems:** Plants with storage silos, multiple asphalt tanks, and additional components can usually benefit from using multiple hot oil circuits. HC-series heaters are designed for such applications. They feature a manifold on the output connection that supplies oil to multiple additional pumps. Each of these side pumps is dedicated to an independent hot oil circuit.

Using multiple circuits reduces the load on each pump, its motor, and its operating pressure. This system is much more flexible than a single-circuit system because each circuit can be operated independently.

**OPERATION & FEATURES**

**Centrifugal Circulating Pump,** mounted on the heater skid, circulates heat transfer oil through the heater. Viton shaft seal rings provide a reliable seal with virtually no leakage.

If the heater is equipped with an optional stack heat exchanger, the oil first enters the exchanger, where it is heated by hot exhaust gases. Oil then exits the stack heat exchanger and enters the helical coil, where it is heated by hot gases from the burner.

**Full-Modulation Burner** conserves fuel, reduces temperature overshooting and eliminates constant on-off burner recycling.

The burner fires into the open center of the helical coil, creating the first pass of hot burner gases. Burner gases then turn at the end of the coil, making a second pass along the coil’s outer surface.
## General Dimensions and Specifications

<table>
<thead>
<tr>
<th>Heater Model</th>
<th>Output Btu/hr</th>
<th>Max. Fuel Usage</th>
<th>Pump Motor HP</th>
<th>Volume Flow Rate (gpm)</th>
<th>Expansion Tank (gallons)</th>
<th>Length A</th>
<th>Width B</th>
<th>Height C</th>
<th>Pipe Size D</th>
<th>Approximate Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single-Circuit Heaters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCS-100</td>
<td>1,200,000</td>
<td>11</td>
<td>1,560</td>
<td>15</td>
<td>15</td>
<td>280</td>
<td>19-1/2&quot;</td>
<td>15'-11&quot;</td>
<td>2&quot;</td>
<td>5,000</td>
</tr>
<tr>
<td>HCS-175</td>
<td>2,000,000</td>
<td>18</td>
<td>2,600</td>
<td>15</td>
<td>15</td>
<td>280</td>
<td>19-1/2&quot;</td>
<td>15'-11&quot;</td>
<td>2-1/2&quot;</td>
<td>8,000</td>
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<tr>
<td>HCS-250</td>
<td>3,000,000</td>
<td>27</td>
<td>3,900</td>
<td>15</td>
<td>15</td>
<td>280</td>
<td>19-1/2&quot;</td>
<td>15'-11&quot;</td>
<td>3&quot;</td>
<td>9,000</td>
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<tr>
<td>HCS-350</td>
<td>4,000,000</td>
<td>36</td>
<td>5,200</td>
<td>15</td>
<td>20</td>
<td>200</td>
<td>18'-7&quot;</td>
<td>11'-2&quot;</td>
<td>3&quot;</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>Multi-Circuit Heaters</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>HC-120</td>
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<td>1,560</td>
<td>15</td>
<td>15</td>
<td>280</td>
<td>19-1/2&quot;</td>
<td>15'-11&quot;</td>
<td>2&quot;</td>
<td>5,000</td>
</tr>
<tr>
<td>HC-200</td>
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<td>18</td>
<td>2,600</td>
<td>15</td>
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<td>280</td>
<td>19-1/2&quot;</td>
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<td>6,000</td>
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<tr>
<td>HC-300</td>
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<td>3,900</td>
<td>15</td>
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<td>280</td>
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<td>9,000</td>
</tr>
<tr>
<td>HC-400</td>
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<td>20</td>
<td>200</td>
<td>18'-7&quot;</td>
<td>11'-2&quot;</td>
<td>3&quot;</td>
<td>10,000</td>
</tr>
</tbody>
</table>

The amount of fuel used is for a thermal efficiency of 85% and one hour of operation at maximum output. A properly sized heater normally runs for intermittent periods at lower outputs. No. 2 fuel usage is based on 132,000 Btu per gallon, its LHV (low heating value). Natural gas usage is based on 905 Btu per cubic foot, its LHV. Heights include the exhaust stack without a stack heat exchanger. The stack heat exchanger for the HCS-350 and HC-400 weighs 800 pounds and adds 2'-7" to their height. For all other models it weighs 460 pounds and adds 1'-9" to their height. **NOTE:** Specifications are subject to change without prior notice or obligation.

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## Helical Coil

The Helical Coil is designed and built to ASME code. It is designed to provide a large heat transfer surface area, low flux rates, and an ideal fluid velocity of 7 to 11 feet per second. ASME stamp is available as an option.

### Stack Heat Exchanger

Stack Heat Exchanger is an available option that can boost the heater’s thermal efficiency by 5%. Hot burner gases exiting the heater pass around a densely packed set of serrated finned tubes inside the heat exchanger. Thermal oil flowing inside the tubes is heated before entering the helical coil.

This option reduces fuel usage by reducing the output demand placed on the burner. This can reduce fuel consumption by 261 gallons of No.2 fuel oil or 345 therms of natural gas per month. A stack heat exchanger usually pays for itself in one year, or less.

### UL-rated, NEMA 4 Control Panel

UL-rated, NEMA 4 Control Panel is the nerve center of the heater’s temperature control and safety systems. Compliance to UL standards not only assures you of the quality of the electrical system, it also puts your insurance company at ease, potentially bringing you lower premiums. The NEMA 4 enclosure provides watertight protection against splashing water, hose-directed water, rain, sleet, snow, ice, dirt, and windblown dust.

Panels that meet CSA specifications, and other NEMA standard enclosures are available optionally.

## Temperature Controllers

Temperature Controllers: Two microprocessor-based controllers provide control over output temperatures. The Temperature Controller regulates the flow of fuel and combustion air to the burner to efficiently maintain the temperature set point on the controller.

The High Media Controller is a safety control. It will shut down the burner if the heat transfer oil reaches the temperature limit set on this controller.

## Flame Monitor

Flame Monitor is a microprocessor-based burner management control system. The monitor provides proper burner sequencing, ignition and flame monitoring protection. In conjunction with limit and operating controls it sequences the burner/blower motor, ignition, and fuel valves to provide for proper and safe burner operation. Other features include:

- Self-diagnostic for safety and reliability.
- Non-volatile memory retains information even when power is interrupted.
- Microprocessor-based for accurate timing, comprehensive diagnostics and precision control.
These usages are based on a 1-million Btu/hr heat load, operating 24 hrs/day, 7 days/week, 40 weeks/yr, a 20 year heater life and No. 2 fuel oil with a heating value of 132,000 Btu/gallon (LHV).
Heat Transfer Fluid Specs

The heat transfer oil should be paraffin base, solvent refined and recommended for operating temperature to 450° F.

Gravity API 28-30
Flash Point 420° F
Viscosity at 100° F 200 SSU
Viscosity at 210° F 50 SSU
Viscosity Index 95 Min.
Pour Point 5° F
Carbon Residue 0.10%
Neutralization No. 0.10%
Sulphur Content 0.5% Max.

Available Options:
- Low-NOx burners (30ppm).
- Ultra low-NOx burners (less than 9ppm).
- Stack heat exchangers for boosting fuel efficiency.
- Optional burner management system utilizes an exhaust stack O₂ sensor to maintain heater operation in adverse climates. Reduces fuel consumption and tunes burner automatically.
- Sock filters for longer fluid and pump life.
- 7-day time clock.
- Non-standard voltage (525/60, 380/50)
- ASME code stamp.
- CSA approved panel
- CRN stamped coils
- Class I Div. I or Class I Div. II explosion-proof components.
- High-temperature (550°F) operation.

Maintenance: The heaters are very easy to maintain. Components are easy to reach. Replacement parts are readily available from CEI’s large parts inventory. We back our products with worldwide parts & service support.
**ADDITIONAL CONFIGURATIONS**

**Vertical Helical Coil Heaters** occupy a relatively small ground footprint, allowing placement of a higher-output heater in a confined space where a horizontal heater of the same output may be too large. Many options are available. All heaters can be customized to meet your specific needs.

**Asphalt Booster Heaters** are a variation of the vertical helical coil heater design. Liquid asphalt is pumped through the coil, where it is heated in the same manner as a two-pass hot oil heater.

Booster heaters are used at bulk storage terminals to boost the temperature of liquid asphalt as it is pumped into a tanker truck for delivery to end users. This allows the terminal to store liquid asphalt at lower temperatures, yet still provide delivery at or near usage temperatures.
Three-Pass Helical Coil Heaters provide higher outputs than two-pass heaters of the same physical size. By elongating the path of burner gases to the exhaust, the three-pass design performs at high thermal efficiency.

Three-pass heaters utilize two helical coils: a smaller inner helical coil fits inside a larger outer helical coil. The burner fires down the center of the inner coil, creating the first pass of hot burner gases. This pass exposes the inner coil to both radiant and convective heat.

At the end of the coil, the burner gases turn and pass through the space between the two coils, creating the second pass. This exposes both coils to convective heat.

At the end of the second pass, the hot burner gases turn and pass along the outer surface of the outer coil, creating the third pass and exposing the outer surface of the outer coil to convective heat.

Heat transfer oil flowing through the two coils, either sequentially or in tandem, gains heat from the hot coils. Many options are available. All heaters can be customized to meet your specific needs.
24/7 Burner Tuning. Less fuel. Less downtime.

Tuning the burner on your hot oil heater improves combustion efficiency, saves fuel costs, and keeps you in-spec on emissions.

But did you know changes in ambient air temperature continue to affect combustion efficiency and fuel consumption? Or that dramatic shifts in air temperature can cause burner shutoffs?

CEI offers an advanced burner management system that uses real-time emissions & temperature data from an O₂ sensor mounted in the exhaust stack to automatically adjust the burner’s fuel-to-air ratio. All day long. 24/7. Get the optional Nexus 4000 system installed on your heater.